LZT 1083714 R1A

Mobile Phone R320s White Paper

ERICSSON

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First edition (March 2000)
Publication number: LZT 108 3714 R1A

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PREFACE

Purpose of this document

The Ericsson R320s White Paper is designed to give the reader a deeper technical understanding of how the Ericsson R320s is designed, and also how it interacts with other media. This document will make it easier to integrate Ericsson R320s in the IT and communication solutions of a company or organisation.

People who can benefit from this document include:

- Corporate buyers
- IT Professionals
- Software developers
- Support engineers
- Business decision-makers

PRODUCT DESCRIPTION

The Ericsson R320s is a Dual Band phone with a lithium battery; a phone of modern design and advanced technology.

- It has a Wireless Application Protocol 1.1 (WAP 1.1) compliant browser, allowing fast access to Internet services. Both access types, GSM Data and SMS, are supported.
- Intelligent synchronization of Calendar and Phone book, with the user's PC or Personal Digital Assistant (PDA), over infrared or cable. This is a unique feature that Ericsson has made available in a mobile phone.
- Built-in Infrared modem turns the Ericsson R320s into a wireless modem for data communication, Internet connection and fax from the user's PC or PDA. An RS-232 cable can also be used if no Infrared is available on the PC.
- Infrared is also used for exchanging business cards, calendar appointments and ring signals between phones.
- It supports Online Services, which makes it possible for operators to provide new services to existing users over the air, including new menus and functions in the phone.
- Profiles feature; groups of settings preset to suit certain environments, such as "In Car", "Meeting", "Home".
- A full graphic display with a new, easy to navigate, user interface software.
- Numbered shortcuts make it possible to prepare settings into a favourite menu which the user can access quickly and easily.

Technical specifications for the phone

General

Product name	Ericsson R320s
System	GSM 900/GSM1800 (e-GSM supported)
SIM card	Small plug-in card, 3V or 5V type
Type number	110 1201-BV

Dimensions and performance

Size	130 x 51 x 15 mm
Weight	with Slim battery approx. 100g
Weight	without battery 75g
Talk time	up to 250 minutes with Ultra Slim battery
	up to 325 minutes with Slim battery
	up to 700 minutes with HighCapacity battery
Standby time	up to 69 hours with Ultra Slim battery
	up to 75 hours with Slim battery
	up to 194 hours with HighCapacity battery
Speech coding	HR, FR, EFR supported where available, for high speech quality
Supported chracters	See "Technical specification of the WAP browser"

Built-in infrared modem

Standards	IrDA DATA with secondary implementation of IrLAP 1.0
	and IrDA-Ultra, IRMC 1.1
	AT commands industry standard, ETSI 07.05 and 07.07
Data rates (up to)	115,200 bps between phone and IrDA device (e.g. PC, another phone)
	38,400 bps for GSM data communication with V.42bis compression
	9,600 bps for GSM data communication, no compression
	9,600 bps in fax communication
AT modem	V.25ter command set supported

Ambient temperatures

Max	+55°C
Min	-10°C

WAP FEATURES

The typical WAP client is a small, portable device which is connected to a wireless network. This includes mobile phones, pagers, smart phones, PDAs and other small devices. In these devices, you have a limited user interface, low memory and computing power compared to desktop and laptop computers. WAP is not a browser for desktop or laptop computers. Thus, WAP will not appear in the majority of today's Internet WWW clients. Instead, WAP is created for the Internet clients that are handheld PCs and mobile phones, and mainly are used to access information, rather than to create information. When you access a web site built with Wireless Markup Language (WML), you will be able to download information quicker than you would be able to access HTML pages with a traditional web browser using the HTML standard. The WAP browser is constructed for WML and cannot read ordinary HTML pages but it is suitable for interaction with customer services offering e. g. ticket reservation. It is also handy when you want to access text-based information, such as timetables, share prices and exchange rates, Internet banking and other interactive services. In addition, it is possible for the service provider to install systems that automatically convert ordinary HTML pages for viewing in a WAP browser.

Using WAP in Ericsson R320s

The built-in WAP browser gives the user a portable, fast, easy-to-use access to a wide variety of services, with possibility of personalised services. For companies and Service Providers, Wireless Application Protocol (WAP) gives new possibilites:

- Improve and simplify the communication flow within an organisation.
- Create a service once, make it accessible on a broad range of wireless networks.
- Address new market segments by launching innovative mobile Value Added Services.
- Keep old customers by adapting existing Internet services to WAP.

Key factors for providing WAP applications for use with Ericsson R320s include:

Easy create for WAP	Creating a WAP service is no harder than creating an Intranet/Internet service today since WML and WMLScript are based on well-known Internet technology.
Using standard tools	It is possible for the service creator to use standard tools like ASP or CGI to generate content dynamically. You can utilise existing investments in databases etc that are the basis of existing Internet services.
Low bandwidth	One of the key advantages of WAP over other Internet standards, is the low bandwidth required for the communication. Partly, this is due to the fact that the WAP application is communicated to the wireless devices in the form of binary encoded data, as opposed to HTTP (HTML), which is text-based.
Gateway conversion	The actual binary encoding is handled by the WAP Gateway. This makes it possible to create WAP applications using the text-based language WML and other tools. In fact, existing HTML-based applications on the Internet can be viewed in the WAP browser, if an automatic converstion is performed in the WAP Gateway.
The WAP profiles	The Ericsson R320s can hold five WAP profiles, each with a group of network settings and a homepage. If you provide a corporate WAP service on your Intranet, it is useful to enter an Intranet WAP profile in the users' phones. The WAP profile holds network settings and user identification. The users can easily switch between the corporate services and WAP services on the Internet, simply by switching WAP profile.

Technical specification of the WAP browser

Feature	Support in Ericsson R320s WAP browser	
Authentication	WAP 1.1. Server applications may request Basic Authentication. Gateway may request Authentication during connection setup.	
Back to previous page	Yes	
Bearer type GSMData(CSD)	Yes, ISDN and analog	
Bearer type SMS	Yes (point-to-point)	
Bookmarks	Yes, up to 25 named bookmarks for easy access to frequently visited pages	
Bookmark Export/Import	Yes, can be sent and received as link using SMS	
Cache	Yes (size 4kbyte). Clear cache can be acheived by using reload to discard the cache contents.	
Character sets *	UTF8 (Default), USAASCII, Latin1, UCS2	
Colour	1 bit (b/w)	
Homepage	Yes, up to 5 different, one for each WAP profile	
Hyperlinks in Text	Yes, highlighted by inverse video	
Hyperlinks in Images	Yes, indicated by a frame	
Image Animation	No	
Image Formats	GIF (interlaced and non-interlaced), WBMP, no transparent layers.	
Network Settings	Up to 5 different settings available by selecting WAP profile (Intranet, Internet, Banking Gateway etc)	
OTA Support	Yes	
PPP Authentication	PAP, CHAP and MS-CHAP	
Reload page	Yes	
Supported Characters, depending on software as indicated by KRC number in the phone **	KRC 114 1027, KRC 114 1156, KRC 114 1157, KRC 114 1189, KRC 114 1190, KRC 114 1191	English(EN), Arabic(AR), Bulgarian(BG), Croatian(HR), Estonian(ET), Hebrew(IW), Latvian(LV), Lithuanian(LT), Romanian(RO), Russian(RU), Serbian(SR), Slovenian(SL)
	KRC 114 1158, KRC 114 1159, KRC 114 1160	English(EN), Dutch (NL), French(FR), German(DE), Greek(EL), Italian(IT), Portuguese(PT), Russian(RU), Spanish(ES), Turkish(TR)

Feature	Support in Ericsson R320s WAP browser	
	KRC 114 1230, KRC 114 1231, KRC 114 1232, KRC 114 1186, KRC 114 1187, KRC 114 1188	English(EN), Arabic(AR), Czech(CS), Danish(DA), Finnish(FI), French(FR), Hungarian(HU), Norwegian(NO), Polish(PL), Portuguese(PT), Russian, Slovakian(SK),Swedish(SV)
	KRC 114 1161, KRC 114 1162, KRC 114 1163	English(EN), Indonesian(IN), Thai(TH), Vietnamese(VI), Philippine- Tagalog(TL), Malay(MS)
Tables	Yes	
WAP/WML	WAP 1.1 compliant, WMLScript Layers implemented: WAE, WSP (connectionless), WDP	
WAP profiles	5 WAP profiles, each with its own settings	

**) When creating WML applications, it is recommended to always save the page contents as UTF8, and that this is clearly indicated in the pages, before publishing. This ensures that the contents of the application can be viewed, regardless of character sets used in gateways and the phone. Please refer to the R320 Design Guidelines for WAP Services, how to create the application correctly.*

***) All characters are not supported in all phones. The software version depends on which market the phone is associated to. Also, please note that the phone may not support input on a WAP Service which use certain characters (languages), even if those characters are supported for browsing in the phone.*

Screen characteristics	Full	Input	Selection
Rows of text	5 (4+header)	4 (3+header)	4 (3+header)
Height of one row (pixels)	13	13	13
Columns (characters)***	32 I or 7 W	26 I or 6 W	9 normal
Pixels (Height x Width)	101 x 65		
Pixel stretch	1,24. This means a pixel is 24% higher than it is wide.		
Image size	Unlimited height, but scrolling required if higher than 4 rows (4*13 pixels). Truncated at both sides if wider than display.		

****) Approximate. The screen font is proportional, and ”W” is a wide character, ”I” is narrow.*

Manual WAP configuration of phone

See the User's Guide for general instructions on configuration. When an operator provides the Gateway service, different bearers might be used, for example SMS or GSM Data. When only GSM Datas is offered the Gateway can be located at an ISP or on a corporate network intranet, and an access server is then used for managing the incoming data calls.

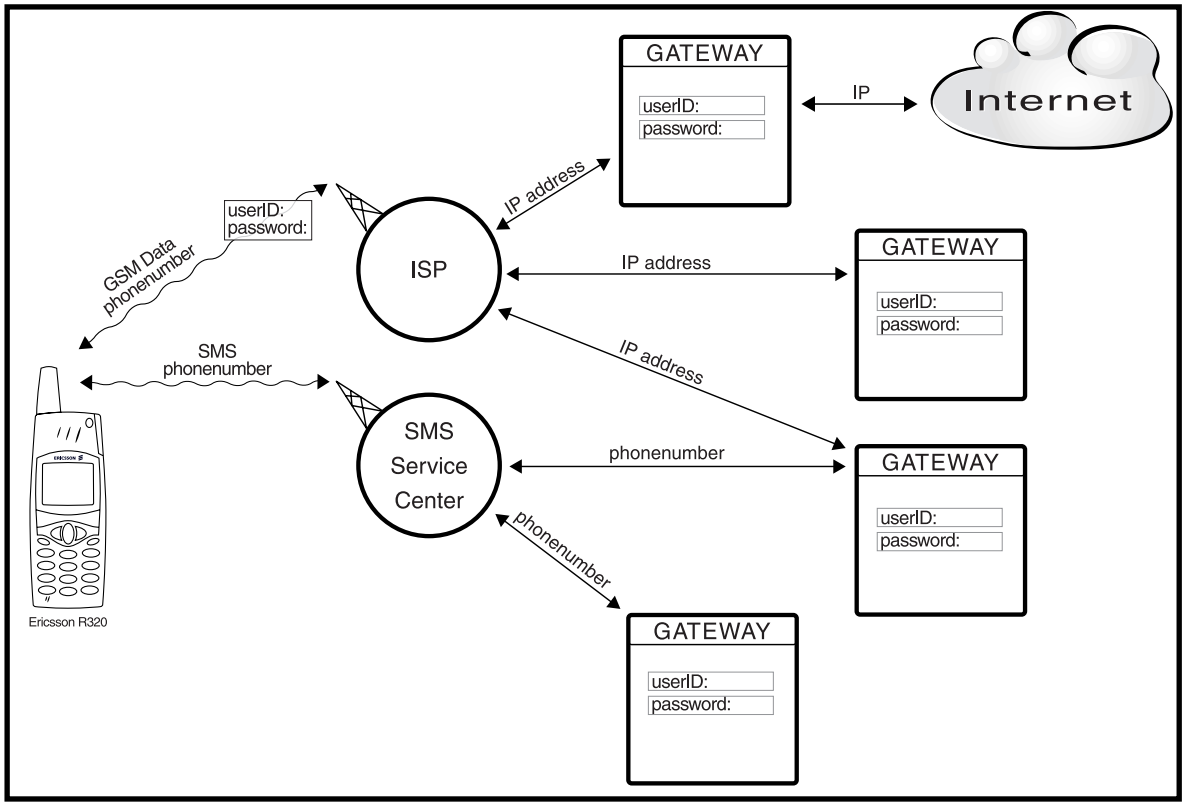


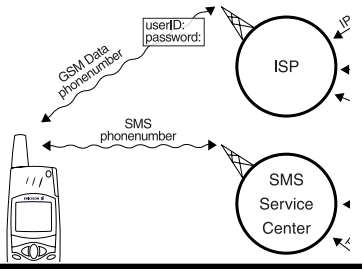
Figure 1. Elements of the WAP model essential for the configuration.

Internet/Intranet access

You have selected a WAP profile to use for the configuration. The Access configuration relates to the WAP model as detailed below.

Access Type
Always ask
GSM Data
SMS

Part of figure showing bearer type selection:



Access
1 Access Type
2 Response Timer
3 Service Centre
4 GSM Data

SMS Service centre in Access menu:

The phonenumber to the SMS Service Centre (only needed when using SMS Access).

or

GSM Data
1 Phone Number
2 Dial Type
3 User ID
4 Password

GSM Data submenu:

The phonenumber to the Internet/Intranet Service Provider (only needed when using GSM Data Access)

Example: Telia DOF is +46705960000.

Dial type ISDN is preferred (if provided by operator) since it allows a faster and better access.

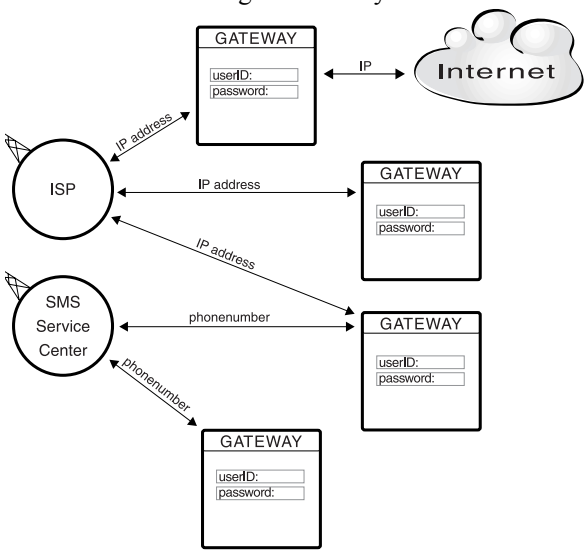
The User ID and Password for the Internet/ Intranet access.

Gateway access

The Gateway can provide services in the company's Intranet, a banking or stock trading service on the Internet, or provide an access to other WAP applications on web addresses anywhere on the Internet. A Gateway is identified by an IP number or by a phonenumber, depending on access type. The Gateway configuration relates to the WAP model as follows.

Access
3 Service Centre
4 GSM Data
5 Gateway

Part of figure Gateways:



Gateway	
1 User ID	The IP number to a WAP Gateway (only when using GSM Data Access).
2 Password	User ID and Password.
3 Data Address	
4 SMS Address	

Gateway	
1 User ID	The phonenumber to a WAP Gateway (only when using SMS Access). The Gateway phonenumber can be understood as the "SMS receiver phonenumber".
2 Password	User ID and Password.
2 Data Address	
4 SMS Address	

This concludes the manual configuration.

Using a PC for configuration

An easy way to perform the WAP configuration of a single phone is by using the Ericsson Phone Settings program. In there, you will find all configuration settings needed for the phone to access the WAP services.

Over the Air configuration

To simplify the provisioning of WAP settings to a number of phones, all settings can be sent as an SMS message to each phone. This makes it easy for an operator, a Service Provider, or a company to distribute settings for Internet/Intranet, and WAP, without having to manually configure each phone. This also makes it easy to upgrade the services provided to the users, without the need for users to perform any manual configuration.

- The OTA configuration message is distributed via SMS point-to-point, not Cell Broadcast.
- The setup information is a binary encoded message. To receive information about OTA specifications, please contact your local Ericsson representative for consumer products.
- The needed user interaction is limited to receiving and accepting/rejecting the configuration message, and selecting which WAP profile to allocate the settings to.
- Security can be handled using a keyword identifier displayed on the screen as a shared secret between the SMS sender and the receiver. It is important that the user has a way to verify that the configuration message is authentic.

Gateway configuration

There are two bearer types, i.e. two ways to access WAP services from the phone, GSM Data or SMS. Which access type should be used is determined by, for example, the ISP. Typical differencies which distinguish the bearer types are listed below.

GSM Data access characteristics

- Circuit connection of data call. This means that the phone is connected during the entire WAP session.
- Voice calls cannot be made or received during the WAP session.
- Comparably higher transmission speed than with SMS access.
- Pricing of GSM Data access can be compared to pricing of data or fax calls in the network.

SMS access characteristics

- SMS point-to-point is used, not SMS Cell Broadcast.
- The connection is maintained by the automatic exchange of ”messages” between the phone and the SMS Service Center.
- Comparably lower transmission speed than with GSM Data access.
- Pricing of SMS access can be compared to pricing of the normal SMS service in the network.

Security issues

The Ericsson R320s is based on the WAP 1.1 specifications where security functionality is specified (WTLS). However, the security part that is specified in WAP 1.1 does not support a complete standardized security solution. A secure WAP application will require proprietary solutions, until a specification supporting full security is available. This diagram shows a simplified example of the security that can be implemented within the current specification.

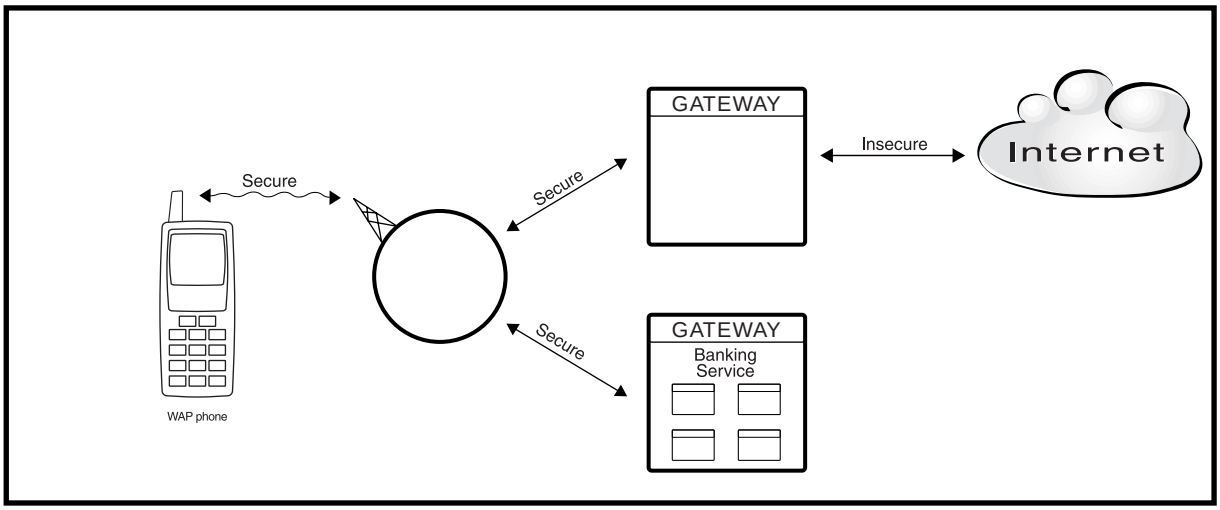


Figure 2. Example showing the limitations of the security implementation.

- The WTLS specification supports security between the wireless equipment and, for example, the WAP Gateway.
- The specification does not support security beyond the Gateway as shown in the diagram above. This means, for example, that WAP applications accessed on the Internet cannot provide privacy, including data integrity and authentication, to the wireless equipment. Therefore, the security part of the WAP 1.1 specification is not implemented in the WAP browser in Ericsson R320s.
- To provide a secure solution, for example a banking service, the Service Provider can design a WAP application with its own WAP Gateway. Each user has their own username and password in the bank's WAP Gateway, which increases the security of the service. This can be regarded in analogy to the solution provided by a "phone banking" service, but with WAP functionality. An implementation of security with this method is supported by Ericsson R320s.

SYNCHRONIZATION FEATURES

Synchronization in Ericsson R320s

Synchronization is a unique feature available in Ericsson R320s. When the phone is connected with the PC, using infrared or cable connection, the Calendar and Phone book in the phone can exchange items with the groupware or calendar program in the PC or handheld computer, like the Ericsson MC218.

Open standard	Communication with any groupware or office application is possible, since the sync method complies to the open standard IrMC 1.1, as specified by the Infrared Data Association, reference http://www.irda.org. This supports device capabilities in order to ensure interoperability between different devices.
Infrared and cable	The Ericsson R320s can synchronise using the IrMC 1.1, also when connecting via cable. This means that the synchronization process is the same, regardless of connection type. However, if no infrared eye is available, a cable connection is used. The cable is either connected to the phone directly, or to the desktop charger. When the phone is placed in the charger, the connection is established.
Automatic sync	When infrared is switched on in the phone, the sync process will start automatically, as soon as the phone is within infrared range of an active infrared port on the PC (a suitable synchronization program must be running on the PC).
Intelligent and fast	The synchronization is very fast between the phone and a PC equipped with any IrMC 1.1 compliant sync functionality, such as XTNDConnect PC for Ericsson. It supports change logs so that only exchanges items that have changed since the last sync. Only the differing data is sent between the phone and the PC.

Compatibility and enterprise integration

In everyday life, access to an updated Calendar and addresses of friends and business colleagues is greatly appreciated. The Calendar of the Ericsson R320s has up to 100 entries that can be synchronized with the Calendar/Agenda program on the user's PC. The Phone book can also be synchronized. The growing use of groupware SW such as Microsoft Outlook and Lotus Notes means that more and more meetings are booked electronically in daily business life. This encourages users to have their calendar electronically stored on the server/PC or PDA and then to update data to or from their phone. The Ericsson R320s supports vCard/vCalendar to exchange business cards/calendar entries with compatible devices.

A very efficient enterprise solution is to use Ericsson R320s together with PCs equipped with XTNDConnect PC for Ericsson. It provides a fast, flexible and easy to use synchronization solution. The integration between XTNDConnect PC for Ericsson and Microsoft Outlook provides an embedded menu for one-key synchronization.

- A mobile worker typically uses SMS and Phone Book Manager.
- An office worker typically uses XTNDConnect PC for Ericsson and Phone Settings

To further enhance the functionality and compatibility, the synchronization software can easily be upgraded.

The number of units that can talk to each other are unlimited. One phone can be partner with several PCs. This ensures that information from both the work PC and the home PC can be

synchronized with the phone. For users that have both a desktop PC and a laptop or a PDA, it is an efficient way to synchronize data with the phone. This way, data can also be transferred between PCs to keep them in sync.

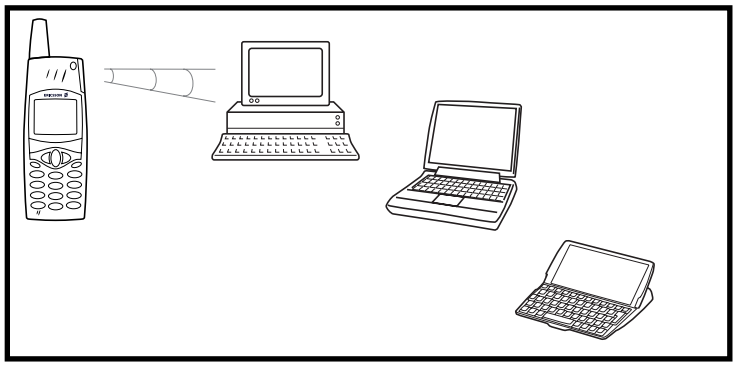


Figure 3. One phone can synchronize with unlimited number of PC/PDA.

If the synchronization software is upgraded to XTNDConnect PC, one PC can be partner with several different phones. This is vital if, for example, each member in a workgroup has their own Ericsson R320s, and needs to synchronize with one PC. It makes it easy, for example, to download a common company phone directory to the Phone book in each company mobile phone. With the full version of the synchronization software, other phone types and handheld devices, such as PDAs and Windows CE computers, can also be synchronized.

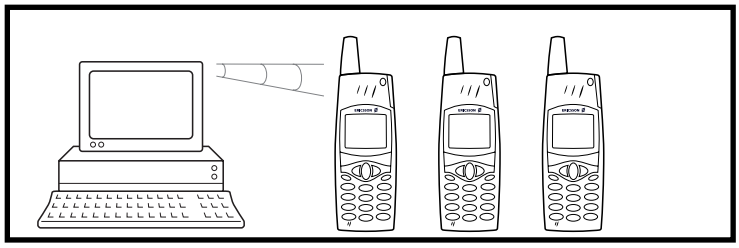


Figure 4. With the full version XTNDConnect PC, any number of phones can be synchronized with the same PC.

XTNDConnect PC for Ericsson

This synchronization software is bundled with the Ericsson R320s and provides a powerful set of functions.

- Phone book and Calendar synchronization for the Ericsson R320s.
- A synchronization menu is embedded inside Microsoft Outlook. It provides one key synchronization and allows the user to control the sync process by easy to use settings.
- PC applications supported by XTNDConnect PC for Ericsson:
  Microsoft Outlook 97, 98, 2000
  Platforms for using XTNDConnect PC for Ericsson:
  Windows 95, 98, Windows NT 4.0
  Pentium PC recommended (minimum 386)
  32 MB RAM recommended (minimum 16 MB)
  10 MB free hard disk space
  Infrared or cable connection
- Support is handled by Ericsson.

XTNDConnect PC

All users of the Ericsson R320s can easily upgrade to the full version of the synchronization software. A number of features and supported applications will then be added, including

XTNDConnect Phone Viewer.

- Phone book and Calendar synchronization for the Ericsson R320s.
- XTNDConnect Phone Viewer makes phone data easy to enter. Use your computer to view, create and edit all data stored on your Ericsson phone.
- PC applications supported by XTNDConnect PC (full upgraded version):
  Microsoft Outlook 97, 98, 2000
  Lotus Notes 4.5, 4.6, R5
  Lotus Organizer 4.1, 5.0, 97, 97 GS, 6.0
  Symantec ACT! 3.05, 4.0, 2000
  NetManage Ecco Pro 4.0
  GoldMine 3.0, 4.0 (Standard Edition)
  Platforms for using XTNDConnect PC:
  Windows 95, 98, Windows NT 4.0
  Pentium PC recommended (minimum 386)
  32 MB RAM recommended (minimum 16 MB)
  10 MB free hard disk space
  Infrared or cable connection
- A synchronization menu is embedded inside Microsoft Outlook. It provides one key synchronization and allows the user to control the sync process by easy to use settings.
- Handheld devices supported include Ericsson R320s, palm-sized and handheld devices using Windows CE and PalmOS. Casio Personal Organizeers.
- All support for the full version is handled by Extended Systems Inct.

BUILT-IN INFRARED MODEM

Infrared communication creates a data link between two communications devices through an infrared beam of light. On the Ericsson R320s, this link can be used as a wireless connection with desktop computers, PDAs, Ericsson handheld computers, laptop PCs, other phones for example Ericsson R320s, and other hardware supporting the standard. The Infrared Data Association (IrDA) set the hardware and software standards that form the infrared communication links. The Ericsson R320s complies to the specification IrMC 1.1, which defines how mobile telephony and communication devices can exchange information. In Ericsson R320s, the specification IrMC 1.1 is also used for communication via a cable.

The infrared modem contains a complete GSM modem. This provides data, fax and email communication, as well as Internet/Intranet access, for a connected PC, PDA or handheld PC. Once the PC/PDA is connected to the phone using infrared or cable, and the appropriate software is installed, the infrared modem in the phone works similar to a PC Card modem, or an external modem.

Key benefits using the Ericsson R320s with its built-in infrared modem:

- True wireless communication
- Low power consumption
- Secure data transmission with the IrDA DATA standard
- Send and receive fax, email and data on the connected PC/PDA
- Connect to the Internet or Intranet/LAN from the connected PC/PDA
- Manage the phone book and the phone settings from a PC
- Exchange business cards and ring signals between similar phones
- Alternatively, if no infrared eye is available, RS-232 cable connection is supported, compliant to IrMC 1.1.

Technical specifications for infrared modem

The infrared modem consists of two parts, integrated in the Ericsson R320s: the infrared link to establish connection with other IrDA devices, and the GSM modem, which provides full modem functionality to a connected PC/PDA.

The built-in modem

Standards	IrDA DATA with secondary implementation of IrLAP 1.0 and IrDA-Ultra, IRMC 1.1., ETSI 07.05 and 07.07
Data rates (up to)	115,200 bps between phone and IrDA device (e.g. PC, another phone) 38,400 bps for GSM data communication with V.42bis compression 9,600 bps for GSM data communication, no compression 9,600 bps in fax communication
AT modem	V.25ter command set supported
Power consumption	Slightly increased depending on type of communication.

Compatibility

Computer	IrDA equipped computers using Win95/98/NT 4.0*, vCard/vCalendar support to exchange business cards/calendar entries.
PDA	Ericsson MC218, Psion5^{MX}, PalmV, PalmIII, other IrDA equipped PDAs running EPOC32 or PalmOS, vCard/vCalendar support to exchange business cards/calendar entries.
Handheld PC	IrDA equipped handheld PCs and PDAs using Windows CE, vCard/vCalendar support to exchange business cards/calendar entries.
Phone	Ericsson R320s to exchange business card, calendar entries and ring signals, as well as other vCard/vCalendar compliant phones

**) Software for IrDA support on NT 4.0 available on http://mobileinternet.ericsson.com.*

Priorities in communication

There is a prioritisation between the different ways of communicating. The WAP browser has the highest priority, the DRS-10 (RS-232) cable has the second highest, and the infrared link has the lowest priority. When the WAP browser is used, both the cable and the infrared link are disabled. When the cable is used, the infrared link is disabled. The infrared link can only be used when none of the cable or the WAP browser are used.

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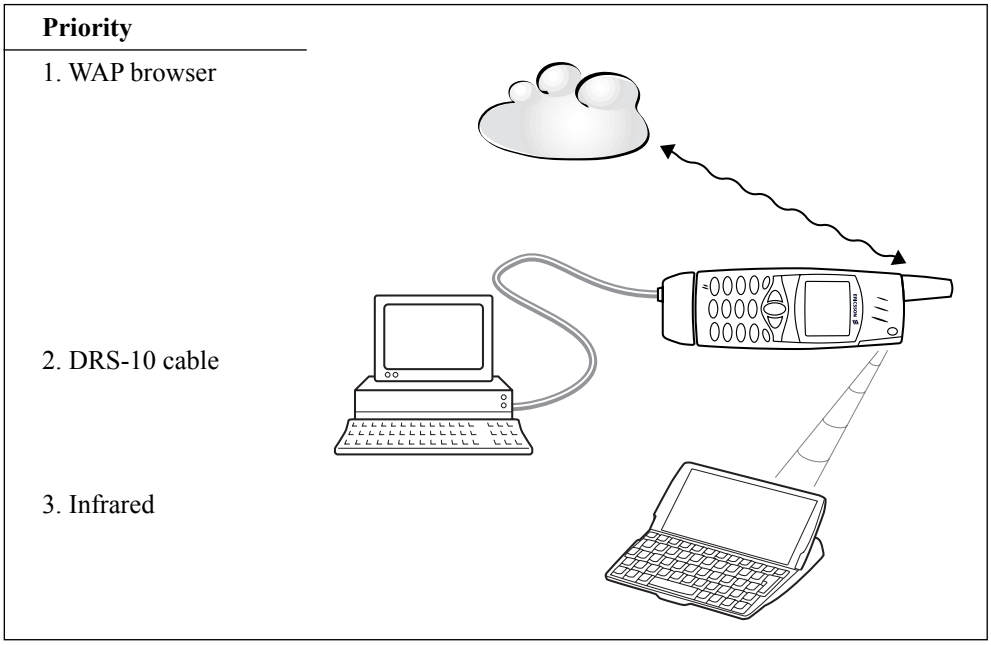

Figure 5. Priorities in communication in the Ericsson R320s

Connection via infrared

IrDA is a point-to-point communication link between two infrared ports. The infrared beam has to be directed towards the target infrared port and as long as the two infrared ports are within sight and range, the devices can exchange data. For the best performance, place the Ericsson R320s within the range of a metre and at a 30 degree angle from the infrared port on the PC/ PDA, or other phone. One advantage of this narrow infrared gap is that the risk of transmitting data to other devices nearby is minimized. The infrared link is a serial connection, which means that the data bits are sent one after another in a long stream. The IrDA–SIR Data Link Standard is a protocol that makes transmission of data faultless. The IrDA–SIR standard provides a high level of noise immunity, which means that it is not sensitive to fluorescent light, sunlight and electromagnetic fields. This makes it suitable for a modern office environment.

Connection via cable

The infrared connection is not always the best solution for connecting with a PC/PDA, or in fact, even possible. The cable DRS-10 provides the same connectivity between the phone and another unit.

The DRS-10 cable supports a subset of the signals in the RS-232 standard, as detailed below.

Signal in RS-232	Support in DRS-10
CD (Carrier Detect)	No. Set statically
CTS (Clear To Send)	Yes
DSR (Data Service Ready)	Statically connected with DTR
DTR (Data Terminal Ready)	Statically connected with DSR
GND (Signal Ground)	Yes
RI (Ring Indication)	No. Set statically
RTS (Request To Send)	Yes
Rx (Received Data)	Yes
Tx (Transmitted Data)	Yes

GSM Data

The built-in data capability turns the phone into a modem when connected to a PC/PDA. To put it simple GSM Data is the ability to send data or fax information over the GSM (Global System for Mobile communication) network. Data over GSM offers new opportunities for both GSM network operators and mobile workers alike. By using GSM to send and receive data or faxes, mobile employees have access to a level of geographic mobility previously unobtainable.

The key benefits of GSM Data include:

- GSM data can be used from any location at any time.
- Ease of use for international travellers.
- GSM data offers a use anytime, anywhere capability, unmatched by fixed telephone networks.
- The cost of using GSM data is reducing over time.
- Interworking with ISDN

One of the key advantages that GSM can offer users, is its ability to interwork with ISDN. This is a core feature of the GSM standard, which has been developed to interwork seamlessly with ISDN. Interworking between the ISDN and GSM networks is made possible by using a technique known as rate adaptation. If the ISDN terminal adaptor being called by the GSM terminal is capable of supporting V.110, i t can adapt the 9,600 bps data from the GSM terminal into 64000 bps ISDN data. This is achieved by adding additional bits to the GSM data effectively packing out the data.

GSM was developed to interwork with the Integrated Services Digital Network (ISDN). ISDN uses a technique known as rate adaptation to convert the slower GSM data up to 64000 bps ISDN data using the International Telecommunications Union (ITU) V.110 rate adaptation protocol, which is a standard for ISDN terminals. As a result when a data call is made from GSM

handset to an ISDN terminal adapter, the quick call set-up capability of ISDN can be utilised. GSM Data makes it possible to send data or fax information over the GSM network. When making a data call, the user simply dials the number they wish to send information to. The call is connected to a Gateway located at the GSM network operator, and then the Gateway takes care of the translation between the different kinds of networks, such as PSTN, ISDN or X.25 networks. Currently the data transmission speed supported is up t 9,600 bps, but with new GSM technologies being developed this will increase.

Using GSM Data for fax communication

Sending a fax is very similar to sending data. When the Ericsson R320s is connected, using infrared or cable, to a PC/PDA, the fax program in the computer will work as if it was connected via an external modem, or a PC Card modem to a fixed line. To send a fax, an initial call is made to the network. The call is then routed through the network to the GSM Interworking Unit (GIWU). The GIWU then establishes a connection to the remote fax machine. The fax protocols are then passed end to end, between the PC/PDA via the phone, and the remote fax machine.

The Ericsson R320s supports fax specifications Group III, class 1 and 2. Class 2 is recommended.

AT commands support

This section outlines the AT commands supported by the Ericsson R320s. The information here can be of use for advanced users, to indicate the possibilities with the phone to:

- develop new communications software
- add the Ericsson R320s to an application's list of compatible modems
- adjust the settings of their mobile telephone and modem.

The infrared modem in the Ericsson R320s supports the V.25ter command set, which is the standard communication set used by modems.

The Ericsson R320s is compatible with industry de facto extensions, ETSI 07.05 and 07.07.

Overview of AT command functions

You use AT commands to configure your mobile telephone, to request information about the current configuration or operational status of your mobile phone, and to test availability and request the range of valid parameters, when applicable, for an AT command.

The infrared modem can be set in any one of three modes of operation. These are:

Off-line Command Mode	The infrared modem is placed in off-line command mode when first powered up and is ready for entry of AT commands.
On-line Data Mode	Allows "normal" operation of the infrared modem, exchanging data or facsimile with the remote modem.
On-line Command Mode	You can switch to on-line command mode when you want to send AT commands to the infrared modem while still remaining connected to the remote modem.

The following illustration summarises the methods that are used to switch between the three infrared modem operating modes.

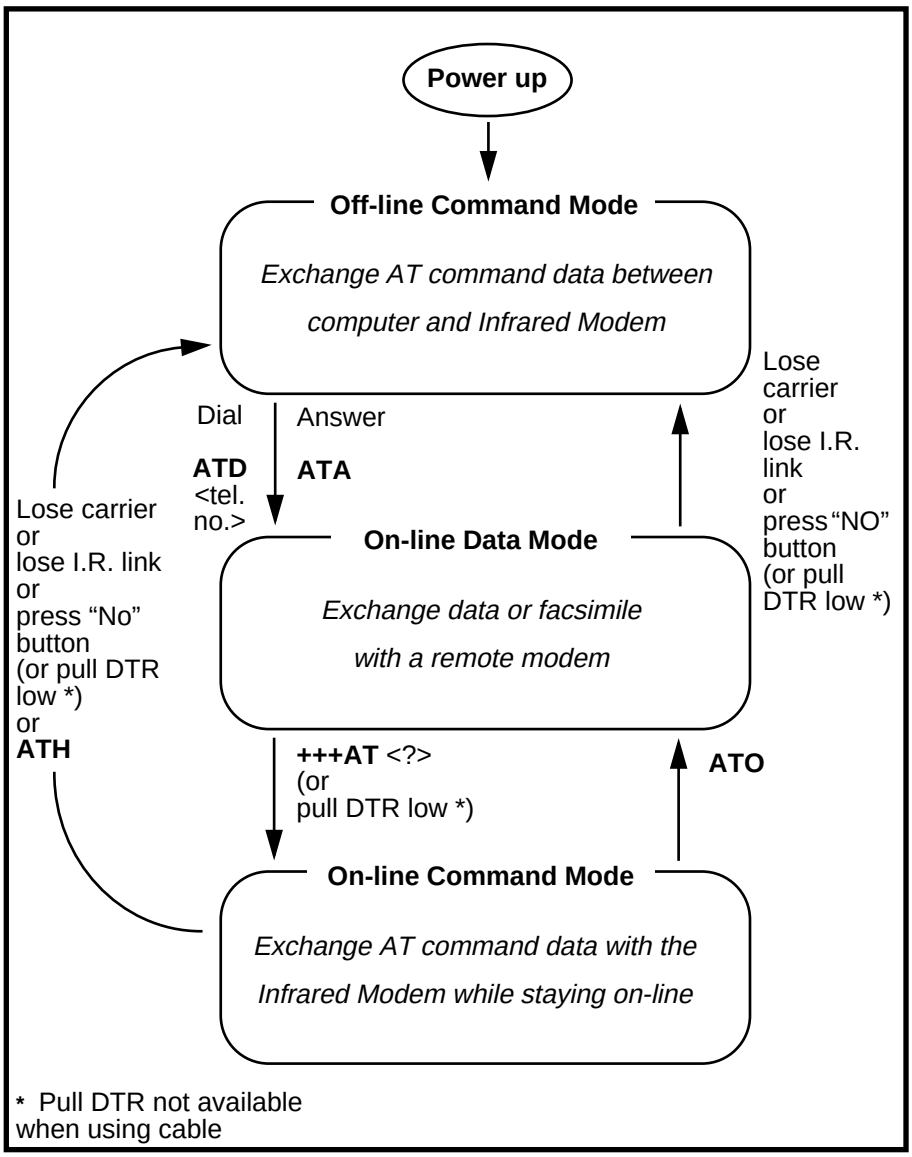
Power up
Off-line Command Mode
Exchange AT command data between computer and Infrared Modem
Dial
ATD <tel. no.>
Answer
ATA
Lose carrier or lose I.R. link or press "NO" button (or pull DTR low *)
Lose carrier or lose I.R. link or press "No" button (or pull DTR low *) or ATH
On-line Data Mode
Exchange data or facsimile with a remote modem
+++AT <?> (or pull DTR low *)
ATO
On-line Command Mode
Exchange AT command data with the Infrared Modem while staying on-line
* Pull DTR not available when using cable

Figure 6. Methods that are used to switch between the three Infrared Modem operating modes

AT commands phone terminal terminated

Ensemble S1/B/E : GSM DTE-DCE Interface commands

+CSCS	Select terminal character set

Ensemble C2/C/E : Control and Identification

AT	Attention Command
Z	Reset to user defined configuration
&F	Set to factory configuration
+CGMI	Request mobile phone manufacturer identification
+CGMM	Request mobile phone model identification
+CGMR	Request mobile phone revision identification
+CGSN	Request ME product serial no identification
*	List all supported commands

Ensemble S2/E : GSM Call Control

+CMOD	Set call mode
+CHUP	Call hang-up
+CRC	Cellular result codes
+VTS	DTMF and tone generation

Unsolicited Result Codes

+CRING	Call mode indication

Ensemble C3/E : Call Control

A	Answer
H	Hook control
D	Dial
+CFUN	Set mobile phone functionality
L	Monitor speaker loudness control

Unsolicited Result Codes

RING	Incoming Call Indication

Ensemble C4/E : Interface Commands

S3	Command line termination character
S4	Response formatting character
S5	Command line editing character
E	Command echo
Q	Result code suppression
V	Result code format

Ensemble S6/C/E : GSM Network Services

+CAOC	Advice of charge
+CNUM	Subscriber number
+CREG	Set network registration
+COPS	Set operator selection
+CLIP	Calling line identification presentation
+CLIR	Calling line identification restriction
+CCFC	Call forwarding
+CCWA	Call waiting
+CHLD	Call related supplementary services
+CSSN	Supplementary service notifications
+CACM	Accumulated Call Meter
+CAMM	Accumulated Call Meter Maximum
*EALS	Ericsson Request ALS Status
*ECSP	Ericsson Customer Service Profile
*ELIN	Ericsson line set
*EPNR	Ericsson Read SIM Preferred Network
*EPNW	Ericsson Write SIM Preferred Network
*ESLN	Ericsson Set Line Name

*ESCN	Ericsson Set Credit Card Number
+CPUC	Price Per Unit And Currency Table
*ESVM	Ericsson Set Voice Mail Number
*EDIF	Ericsson Divert Function
*EDIS	Ericsson Divert Set

Unsolicited Result Codes

+CREG	Network Registration
+CLIP	Calling Line Identification Presentation
+CCWA	Call Waiting
+CSSU	Supplementary service notification
+CSSI	Supplementary service notification
*EDIF	Ericsson Divert Function

Ensemble S8/C/E : GSM Facility Lock

+CLCK	Facility lock
+CPWD	Set/change new password

Ensemble C9/C/E : Multi Mode Phones

+WS46	Mode selection

Ensemble S9/C/E : GSM Mobile Equipment,Control and Status

+CKPD	Keypad control
+CIND	Indicator control
+CPAS	Mobile phone activity status
+CPIN	Send Password
+CBC	Mobile phone battery charge
+CSQ	Mobile phone signal quality
+CMER	Mobile equipment event reporting
+CVIB	Vibrator Mode
*ECAM	Ericsson call monitoring
*EDME	Ericsson enable data menus
*ELAN	Ericsson Language
*EMAR	Ericsson master reset
*ERIL	Ericsson ring level set
*ERIN	Ericsson ring set
*ERIP	Ericsson ring signal playback command
*ESIL	Ericsson silence command
*ESKL	Ericsson settings key lock mode
*ESKS	Ericsson settings key sound
*ESMA	Ericsson set message alert sound
*ESMM	Ericsson settings minute minder
*ESAM	Ericsson settings answer mode
*ESBL	Ericsson settings back light mode
*ESDF	Ericsson settings date format
*ESOM	Ericsson settings own melody
*ESTF	Ericsson settings time format
*ETXT	Ericsson text command

Unsolicited Result Codes

+CKEV	Keypad event
+CIEV	Indicator event reporting
*ECAV	Ericsson Call Monitoring event

Ensemble S11/C/E : GSM SMS and CBS PDU Mode

+CSMS	Select SMS message service
+CPMS	Preferred SMS message storage
+CMGL	List messages
+CMGR	Read message
+CMGS	Send SMS messages
+CMSS	Send from storage

+CMGW	Write message to memory
+CMGD	Delete message
+CMGF	Message format
+CSCA	SMS service centre address
+CSCB	Select cell broadcast message type
+CSAS	Save Settings
+CRES	Restore Settings
+CNMI	New message indication to TE

Unsolicited Result Codes

+CBM	New Message Indication
+CMTI	New Message Indication
+CMT	Received Message
+CMS	Report operational/access failure (+CMS)

Ensemble S14/E : GSM Digital Binary Ping Pong Mode

*BINARY	Start binary mode

Ensemble S16/C/E : GSM Phonebook Commands

+CPBS	Select mobile phone phonebook memory storage
+CPBR	Read mobile phone phonebook entries
+CPBF	Phonebook Find
+CPBW	Write mobile phone phonebook entries
*ECAR	Ericsson Callers Allowed Read
*ECAW	Ericsson Callers Allowed Write
*EPRR	Ericsson Personal Ringtype Read
*EPRW	Ericsson Personal Ringtype Write
*ECAS	Ericsson Callers Allowed Set

Ensemble S18/E : GSM Clock, Date and Alarm Handling

+CCLK	Clock
+CALA	Alarm

Ensemble S19/E : GSM Subscriber Identification

+CIMI	Read International Mobile Subscriber Identity (IMSI)

Ensemble C20/C/E : Audio Control

*EALR	Audio Line Request
*EARS	Analog Ring Signal Request
*EMIR	Mute Indication Request
*EAMS	Audio Mode Selection
*EPHD	Portable Hands Free Detection
*ECBP	CHF Button Pushed

Unsolicited Result Codes

*EALV	Audio Line Response
*EMIV	Music Mute Indication Response

Ensemble S20/C/E : Ericsson Specific AT Commands for GSM

*ECUR	Ericsson current report
*EENL	Ericsson Environment List
*EKSP	Ericsson Key Sound Playback
*EKSR	Ericsson Key Sound Change Report
*EMIC	Ericsson microphone mode
*EPEC	Ericsson Profile Environment Change
*EPEE	Ericsson pin event
*EPED	Ericsson Profile's List Of Environments Delete
*EPEW	Ericsson Profile's List Of Environments Write
*EAPS	Ericsson Active Profile Set
*EAPN	Ericsson Active Profile Rename
*ESNU	Ericsson settings number
*EBCA	Ericsson Battery And Charging Algorithm

*EQVL	Ericsson External Volume Status
*EXVC	Ericsson Set External Volume Control

Unsolicited Result Codes

*EBCA	Ericsson Indication Algorithm Status
*EPEV	Ericsson Pin Code event
*EVOLC	Ericsson Volume Change Report
*EKSC	Ericsson Key Sound Change Report

Ensemble C21/C/E : Accessory Menus

*EAM	Ericsson Add Accessory Menu Item
*EAST	Ericsson Accessory Status Text
*EASM	Ericsson Accessory Sub Menu
*EAID	Ericsson Accessory Input Dialog

Unsolicited Result Codes

*EAAI	Ericsson Accessory Additional Indication
*EAMI	Ericsson Accessory Menu Indication
*EAII	Ericsson Accessory Input Dialog Indication

Ensemble C22/C/E : Accessory Authentication

+CSCC	Secure Control Command

Ensemble C24/C/E : Voice Call Control

*EVA	Answer Incoming Call Command
*EVD	Voice Dial Command
*EVH	Voice Hook Command

Ensemble C25/E : ETSI 07.10 Multiplex Protocol

+CMUX	Activate Multiplex Protocol

Ensemble C26/C/E : Accessory Identification

*EACS	Ericsson Acccessory Status

Ensemble S29/C/E : WAP Browser

*EWIL	Ericsson Wap Image Load
*EWHP	Ericsson Wap Homepage
*EWPR	Ericsson Wap Profiles
*EWPN	Ericsson Wap Profile Name
*EWDT	Ericsson Wap Download Timeout
*EWCT	Ericsson Wap Connection Timeout
*EWLI	Ericsson Wap Login
*EWCL	Ericsson Wap Connection Login
*EWPB	Ericsson Wap Preferred Bearer
*EWCG	Ericsson Wap Csd Gateway
*EWIP	Ericsson Wap Ip-network Phonenumber
*EWSA	Ericsson Wap Smsc Address
*EWSG	Ericsson Wap Sms Gateway
*EWBA	Ericsson Wap Bookmark Add
*EWBR	Ericsson Wap Bookmark Read

Ensemble C30/C/E : VAD Support for Vehicle HF 3V

*EYRR	Recording Result
*EYRE	Recognised Entry
*EYDO	Done
*EYRV	Registered VAD
*EYPI	Phone Info

Unsolicited Result Codes

*EYPE	Play Entry
*EYPP	Play Prompt
*EYRE	Recognise

*EYTN	Train Name
*EYPT	Play Training Recording
*EYDE	Delete Entry
*EYSR	Save Recording
*EYAB	Abort
*EYGP	Get Phones
*EYDP	Delete Phone
*EYRP	Register Phone
*EYSS	Start Synchronise

Ensemble C31/C/E : Quick Menu

*ECMW	Ericsson Customized Menu Write
*EMLR	Ericsson Menu List Read

AT commands modem terminated

Ensemble S1/B/E : GSM DTE-DCE Interface commands

+CSCS	Select terminal character set

Ensemble C2/B : Identification and Control

AT	Attention Command
Z	Reset to user defined configuration
&F	Set to factory configuration
I	Identification information
+GMI	Request Infrared Modem manufacturer identification
+GMM	Request Infrared Modem model identification
+GMR	Request Infrared Modem revision identification
+GCAP	Request Infrared Modem capabilities list

Ensemble S2/B : GSM Call Control

+CR	Service reporting control
+CRC	Cellular result codes

Unsolicited Result Codes

*CRING	Cellular result code

Ensemble C3/B : Call Control

A	Answer
H	Hook control
D	Dial
O	Return to on-line data mode
P	Select pulse dialling
T	Select tone dialling

Ensemble S3/B : GSM Data/Fax

+CRLP	Radio link protocol
+CBST	Select bearer service type

Ensemble C4/B : Interface Commands

S2	Escape sequence character
S3	Command line termination character
S4	Response formatting character
S5	Command line editing character
E	Command echo
Q	Result code suppression
V	Result code format
&C	Circuit 109 (DCD) control
&D	Circuit 108 (DTR) response
+IFC	DTE-DCE local flow control
S0	Automatic answer control
S6	Blind dial delay control
S7	Connection completion timeout
S8	Comma dial modifier delay control
S10	Automatic disconnect delay control
M	Monitor speaker control
X	Call progress monitoring control

Ensemble S4/B : GSM Extended Error Reporting

+CEER	Extended error report

Ensemble C6/B : Data Compression

+DS	Data compression
+DR	Data compression reporting

Unsolicited Result Codes

+DR	Data Compression Indication

Ensemble S10/B : GSM Mobile Equipment Error Control

+CMEE	Report mobile equipment error

Ensemble C18/B : Fax Class 1

+FCLASS	Capabilities Identification and Control
+FMI	Manufacturer identification
+FMM	Request product identification
+FMR	Request version
+FTS	Stop transmission and wait
+FRS	Receive silence
+FTM	Facsimile transmit
+FRM	Facsimile receive
+FTH	Transmit HDLC
+FRH	Receive HDLC

Ensemble C19/B : Fax Class 2

+FCLASS	Capabilities Identification and Control
+FAA	Fax auto answer setting
+FAXERR	Request hang-up cause code
+FBADLIN	Number of consecutive bad lines to accept
+FBADMUL	Bad line multiplier parameter
+FBOR	Facsimile page transfer bit order parameter
+FBUF	Buffer size report
+FBUG	Session Message Report
+FCQ	Copy quality checking
+FCR	Capability to receive parameter
+FCIG	Local polling ID parameter
+FCTCRTY	Continue to correct count during ECM
+FDFFC	Data format failure check
+FDCC	TAE Capability parameters
+FDCS	Session results
+FDIS	Current session negotiation parameters
+FDR	Fax data receive command
+FDT	Fax data transmission command
+FECM	Error correction mode
+FET	Page punctuation
+FK	Orderly fax abort
+FLID	Local polling ID parameter
+FLNFC	Page length format conversion parameter
+FLPL	Document for polling parameter
+FMDL	Request product identification
+FMFR	Request manufacturer’s identification
+FMINSP	Minimum facsimile page transfer speed parameter
+FPHCTO	Facsimile page transfer timeout parameter
+FPTS	Page transfer status parameter
+FREV	Request DCE revision
+FRBC	Receive data block size
+FREL	Facsimile page transfer EOL alignment parameter
+FSPL	Enable polling parameter
+FTBC	Fax page transfer data transmit byte count parameter
+FVRFC	Vertical resolution conversion parameter
+FWDFC	Page width conversion parameter

APPLICATIONS

Profiles

The profile feature; group of settings preset to suit a certain environment. The profiles are also related to intelligent accessories such as a desktop charger, a portable or vehicle handsfree; useful for company integration with call forwarding etc.

The easiest way to set up the profiles in one or several phones, is by using the Ericsson Phone Settings program.

Fixed Dialling and Call Barring

For a company or an organisation, it can be useful to restrict the possibilities to make calls. Fixed Dialling allows you to preset a number of digits, for example area codes. This restricts the user to make calls only to numbers which use the preset digits as leading digits. Fixed Dialling makes use of the PIN2, and it requires fixed dial fields on the SIM Card. Check with your Operator for this feature.

Call Barring allows you to block outgoing or incoming calls in certain situations, for example international calls. See the User's Guide for a description.

Personal Phone Book

In a company or an organisation, you may need to deploy several phones with a common set of Phone Book entries. To do this, you can do in one of the following ways:

- Use the Ericsson Phone Book and SMS Manager on your PC to prepare the common Phone Book entries. Then send the Phone Book entries from the PC to each and every phone. See the User's Guide.

or

- Prepare the Phone Book on one SIM card in one phone. Then copy the contents from the SIM card to each and every SIM card for the other phones. See the User's Guide.

Voice Dialling

Voice dialling of 10 different phone numbers. Voice accept or reject of incoming calls.

Voice Memo

Voice memo is accessed either through the regular menu system or by pressing the button marked with a microphone. You can record either your own voice or the voice of the person with whom you are speaking. You can also record short memos to yourself. Total record time 92 seconds for HR mode. However, in FR or EFR modes, the available record time will be filled quicker, since more sound data is recorded to give a higher quality.

Note that it may not be allowed to record the voices of other parties in conversation. Please check the appropriate regulations before using this function.

Code Memo

If a password is lost, there is absolutely no technical possibility to retreive the password or the hidden information from the phone's Code Memo. Therefore, it is recommended to keep a code in more than one place (in more than one Code Memo), if the code is critical to an organisation or to a work group.

Calendar Entry Exchange

Calendar entries can be exchanged with other applications, according to the vCalendar specification. Using vCalendar, events, appointments, "to-do" items and meeting information can be "beamed" to and from any IrDA equipped application with support for vCalendar, including PDAs, PIMs, laptops and phones.

Business Card Exchange

Businesscards can be exchanged with other applications, according to the vCard specification. vCard information can include name, address, phone number, e-mail address, but also elements like pictures, company logos, live Web addresses, and so on. Any IrDA equipped application with support for vCard can "beam" business cards, including PDAs, PIMs, laptops and phones.

Ring Signal Exchange

The Ericsson R320s supports exchange of ring signals to and from other Ericsson R320s.

SMS

The Ericsson R320s is capable of sending and receiving SMS messages. With the Short Message Service, a user can send text messages containing up to 160 characters to and from GSM mobile stations. A Service Centre (SC) acts as a store and forward centre. The Ericsson R320s also supports using SMS as a bearer type for connecting to WAP.

SMS consists of two basic services:

- Mobile Originated SMS (from a Mobile Station to a SMS-C)
- Mobile Terminated SMS (from a SMS-C to a Mobile Station)

For Mobile Originated SMS, an SMS message is sent from a Mobile Station to the SMS-C where it is forwarded to its destination. This can be another Mobile Station, or a terminal in the fixed network.

A Mobile Terminated SMS is when an SMS message is forwarded from the SMS-C to a Mobile Station. When the Mobile Station receives the message, it returns a delivery report saying the transfer was successful.

ONLINE SERVICES

SIM Application Toolkit (SIM AT) is a smartcard centric method of deploying applications that applies only to GSM and to SMS and USSD transports. Applications must be distributed on smartcards. WAP is an Internet centric method of deploying applications that is independent of the network technology. Applications and content are kept centrally on web servers and downloaded as required. While there is some overlap, WAP is a particularly good choice when deploying applications that also have an HTML version for desktop use. There is current work on building interfaces between the two technologies.

For an operator, a company or a Service Provider, SIM AT offers a prowerful way to deploy applications and services to users, without the need for new or upgraded equipment. All necessary setup and programming is distributed to the users over the air, directly to their phones. In the Ericsson R320s, a separate menu is available for functions residing on the SIM. These can include submenus for the user to control the functions, and also functions which allows the phone to initiate calls, send data, display information to the user.

SIM AT Services supported by Ericsson R320s

Service	Mode		Support in R320
CELL BROADCAST DOWNLOAD			Yes
DISPLAY TEXT	bit 1:	0 = normal priority	Yes
		1 = high priority	Yes
	bit 8:	0 = clear message after a delay	Yes
		1 = wait for user to clear message	Yes
GET INKEY	General: The GET_INKEY requires that the user presses "Yes" to confirm his choice		Yes
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = character sets defined by bit 1 and bit 2 are enabled.	No
		1 = character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested.	No

Service	Mode		Support in R320
GET INPUT	General: No of hidden input characters.		20
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = ME may echo user input on the display	Yes
		1 = user input shall not be revealed in any way (see note)	Yes
	bit 4:	0 = user input to be in unpacked format	Yes
		1 = user input to be in SMS packed format	Yes
	bit 8:	0 = no help information available	Yes
		1 = help information available	No
MORE TIME			Yes
POLLING OFF			Yes
POLL INTERVAL			Yes
PROVIDE LOCAL INFORMATION	'00' = Location Information (MCC, MNC, LAC and Cell Identity)		Yes
	'01' = IMEI of the ME		Yes
	'02' = Network Measurement results		No
	'03' = Date, time and time zone $(DTTinPLI)$		No
REFRESH	General: The reset option requests the user to turn off and turn on the mobile.		Yes
	'00' =SIM Initialization and Full File Change Notification;		Yes
	'01' = File Change Notification;		Yes
	'02' = SIM Initialization and File Change Notification;		Yes
	'03' = SIM Initialization;		Yes
	'04' = SIM Reset;		Yes
SELECT ITEM			Yes
SEND SHORT MESSAGE	bit 1:	0 = packing not required	Yes
		1 = SMS packing by the ME required	Yes
SEND SS			Yes

Service	Mode	Support in R320
SET UP CALL	General: Capability configuration	Yes
	Setup speech call CallParty Subaddress	No
	DTMF support	Yes
	'00' = set up call, but only if not currently busy on another call;	Yes
	'01' = set up call, but only if not currently busy on another call, with redial;	Yes
	'02' = set up call, putting all other calls (if any) on hold;	Yes
	'03' = set up call, putting all other calls (if any) on hold, with redial;	Yes
	'04' = set up call, disconnecting all other calls (if any);	Yes
	'05' = set up call, disconnecting all other calls (if any), with redial;;	Yes
SET UP MENU		Yes
SMS PP DOWNLOAD		Yes
START MENU		Yes

User interaction with SIM AT

DISPLAY TEXT	A text string of up to 160 characters (80 UCS coded) is supported.
Text clearing times	10-20 seconds. 60-second timeout limit for the user to clear the text.
'Key' responses	'Long NO' – Proactive session terminated by user. 'NO' – Backward move in proactive session. Any other key clears display if the command is successfully performed.
GET INKEY	Prompt for a one character input. Pressing 'YES' without entering any character gives warning message "Minimum 1 characters".
'Key' responses	'CLR' clears current character. 'Long NO' terminates the proactive session. 'NO' – Backward move in proactive session. 'YES' – Command performed successfully.
GET INPUT	Prompt for character input. Pressing 'YES' without entering any character gives warning message "Minimum 'no' characters". The phone will refuse to accept further input when maximum response length is exceeded.
MMI Maximum Response lengths	Digits Only – xx characters SMS default alphabet characters – 160 characters Hidden Characters (Digits Only) – 20 characters
'Key' responses	'CLR' clears current character/characters. 'Long No' terminates the proactive session 'NO' – Backward move in proactive session 'YES' – Command performed successfully
REFRESH	A requirement to power down the phone and then power up again can be sent to the user with the text 'Operator has updated your SIM! Restart phone to update!'.
SELECT ITEM	Scroll to highlight item for selection. The maximum number of items supported by the phone within one Select Item command, is 30.
'Key' responses	Down arrow – Scroll down list Up arrow – Scroll up list Long No' terminates proactive session 'NO' – Backward move in proactive session 'YES' – Command performed successfully
SEND SHORT MESS.	Default message "Sending message Please wait" can be replaced for the Alpha Identifier text, or suppressed completely if a null text is provided. Responses are "MESSAGE FAILED" or MESSAGE SENT".
'Key' responses	'Long No' or 'NO' terminates the proactive session
SET UP CALL	If the ME is on a call when the command 'Set up Call, putting all other calls on hold' is sent, the user will see the text 'Setting up a call current call will be held'. If the 'YES' key is pressed the current call will be put on hold and the new call set up. If the ME is on a call when the command 'Set Up Call, disconnecting all other calls' is sent, the user will see the text 'Setting up a call current call will be disconnected'. If the 'YES' key is pressed the current call will be disconnected and the new call set up.
SET UP MENU	Incorporates a SIM Application Toolkit Menu Item into the ME's main menu structure. From the standby display the right or left arrow buttons can be pressed to select the Menu Items. (Note: The SIM AT menu option is found in the 'Extras' menu). If an Alpha Identifier is supplied in the Set Up Menu command this is used as the SIM AT entry in the ME's main menu. If no alpha identifier

	is supplied and only one item provided, then this item is used as header. If no alpha identifier is supplied and several items are found in the menu, a default title is used. If the SIM AT Menu Item is selected using the 'YES' key all the items sent in the Set Up Menu command will be available for selection, in the same way as the Select Item command. A limit of 30 menu items has been set within this command.
'Key' responses	Down arrow – Scroll down list Up arrow – Scroll up list Side key: Scrolls the menu 'YES' – Envelope (Menu Selection)

TERMINOLOGY AND ABBREVIATIONS

Beam	Sending an item to another phone or a compatible application using the infrared link.This can include ring signals, calendar entries, business cards.
Bearer	The method for accessing WAP from the phone, for example GSM Data (CSD) and SMS.
bFTP	binary File Transfer Protocol.
Calling Line Identification (CLI)	Shows the number of the person calling you in your mobile phone display. You can then make an informed choice as to whether or not to take the call. Bear in mind that not all numbers can be displayed. To use this service, it must be supported by your network.
Card	A single WML unit of navigation and user interface. May contain information to present to the user, instructions for gathering user input, etc.
CGI	Common Gateway Interface.
CSD	Circuit Switched Data.
Deck	A collection of WML cards.
DTMF or Touch Tone	Dual Tone Multi Frequency signal – codes sent as tone signals. Used for telephone banking, accessing an answering machine, etc.
Dual Band GSM 900/1800	Your phone is a dual band phone, which means that you can use your phone on two different kinds of networks – the GSM 900 and the GSM 1800 (also called PCN or DCS 1800) systems. A dual band phone that combines the two standards can use both frequencies. This increases capacity in densely populated urban areas, and consequently improves the coverage offered by your network operator. It also offers you enhanced international roaming, thanks to the additional networks now available when you are travelling. The switching between the two systems is done automatically and seamlessly, which means that you can use your phone without ever having to consider which system is best at the time. This is taken care of by the networks. However, you should note that the functions offered and the network coverage differ depending on your choice of operator and/or subscription.

e-GSM	Extended GSM, e-GSM, are new frequncies specifiied by the European Radio communications Committee (ERC) for GSM use when additional spectrum is needed (Network dependent). It allows operators to transmit and receive just outside GSM's core 900 frequency band. This extension gives increased network capability, which favours both the user and the operators.
EFR	Enhanced Full Rate, speech coding.
FIR	Fast Infrared.
Fax Class	Standards for fax transmission are set as classes. Class I and II allow data transfer speeds of between 2400 up to 9600 bps.
FR	Full Rate, speech coding.
Gateway	A WAP Gateway typically includes the following functionality: : A Protocol Gateway – the protocol gateway translates requests from the WAP protocol stack to the WWW protocol stack (HTTP and TCP/IP). : Content Encoders and Decoders – the content encoders translate Web content into compact encoded formats to reduce the size and number of packets traveling over the wireless data network.
GIF	Graphics Interchange Format.
GSM 900	GSM is the world's most widely-used digital network, now operating in over 100 countries around the world, particularly in Europe and Asia-Pacific. The Global System for Mobile Communications is the most-widely used digital mobile phone system. The GSM systems family also includes GSM 1800 and GSM 1900. There are different phases of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.
GSM 1800	Also known as DCS 1800 or PCN, is a digital network working on a frequency of 1800 MHz. It is used in Europe and Asia-Pacific.
HDML	Handheld Device Markup Language.
HDTP	Handheld Device Transport Protocol.
HR	Half Rate, speech coding.
HTML	HyperText Markup Language.
HTTP	Hypertext Transfer Protocol.
Image	WBMP or GIF image contained in a Card.
IrMC	Infrared Mobile Communications standard.
IrDA	Infrared Data Association.
ISP	Internet Service Provider.
ITTP	Intelligent Terminal Transfer Protocol.
ME	Mobile Equipment.
Micro browser	Accesses and displays the Internet contents in your mobile phone, just as an ordinary browser does in your computer. The micro browser uses small file sizes and the bandwidth of the wireless-handheld network.
OTA	Over-the Air Configuration. To provide settings for the phone by way of sending a message, SMS, over the network to the phone. This reduces the need for the user to configure the phone manually.
PDA	Personal Digital Assistant.
Phone Book	A memory in your mobile phone or SIM card where phone numbers

	can be stored and accessed by name or position.
SC	Service Center (for SMS).
Service Provider	A company that provides services and subscriptions to mobile phone users.
SIM card	Subscriber Identity Module card – a card that must be inserted in any GSM-based mobile phone. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized but both types have the same functions. Your phone uses the small plug-in card.
SIR	Serial Infrared.
SMS	Short Message Service. Allows messages of up to 160 characters to be sent and received via the network operator's message centre to your mobile phone. Messages are stored if the phone is off or out of reach ensuring that they reach you. To use this service, it must be supported by your network.
SS	Supplementary Services
TCP/IP	Transmission Control Protocol/Internet Protocol.
TLS	Transport Layer Security.
URL	Uniform Resource Locator.
USSD	Unstructured Supplementary Services Data.
VAS	Value Added Service.
vCalendar	vCalendar defines a transport and platform-independent format for exchanging calendaring and scheduling information for use in PIMs/ PDAs and group schedulers. vCalendar is specified by IETF.
vCard	vCard automates the exchange of personal information typically found on a traditional business card, for use in applications such as Internet mail, voice mail, Web browsers, telephony applications, call centers, video conferencing, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.
WAE	Wireless Application Environment.
WAP	Wireless Application Protocol. Handheld devices, low bandwidth, binary coded, a deck/card metaphor to specify a service. A card is typically a unit of interaction with the user, that is, either presentation of information or request for information from the user. A collection of cards is called a deck, which usually constitutes a service.
WAP Application	A collection of WML cards, with the newcontext attribute set in the entry card.
WAP service	A WML application residing on a web site.
WBMP	WAP Bitmap.
WDP	Wireless Datagram Protocol.
WML	Wireless Markup Language. A markup language used for authoring services, fulfilling the same purpose as HyperText Markup Language (HTML) do on the World Wide Web (WWW). In contrast to HTML, WML is designed to fit small handheld devices.
WMLScript	WMLScript can be used to enhance the functionality of a service, just as for example JavaScript may be utilised in HTML. It makes it possible to add e.g. procedural logic and computational functions to WAP

	based services.
WSP	Wireless Session Protocol.
WTLS	Wireless Transport Layer Security.
WWW	World Wide Web.
XML	Extensible Markup Language.

RELATED INFORMATION

Documents

- Ericsson R320s User's Guide
- Ericsson R320 FAQ
- R320 Design guidelines for WAP Services
- AT Command Reference Manual
- WAP 1.1 Specification

Software

- XTNDConnect PC for Ericsson, bundled with the phone.
- XTNDConnect PC, upgraded version from Extended Systems Inc.

Links

- http://mobileinternet.ericsson.com
- http://www.ericsson.com/wap
- http://www.extendedsystems.com
- http://www.irda.com
- http://www.wapforum.org
- http://www.imc.org/pdi/

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